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Research Report

OPTIMATION OF 48 kHz ULTRASONIC WAVE DOSE FOR THE INACTIVATION OF *Salmonella typhi*

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ABSTRACT

This study was aimed to determine the effect of ultrasonic dose exposure which could decrease the viability of Salmonella typhi by using the variation of exposure time (15, 20, 25, and 30 minutes) and volume of bacterial suspension (2, 4, 6, and 8 ml) at constant power. The sample used was Salmonella typhi. Ultrasonic wave transmitter was a piezoelectric tweeter with 0,191 watts of power and 48 kHz frequency generated by the signal generator. Piezoelectric tweeter was a kind of transducer which converted electrical energy into ultrasonic energy. This research was an experimental laboratory with a completely randomized design. The decrease of bacterial percentage was calculated by using TPC (Total Plate Count). Data were analyzed by using One Way Anova. The results showed that the variation of exposure time and volume of bacterial suspension gave significant effect on the percentage of Salmonella typhi kill. The most optimal of ultrasonic dose exposure to kill Salmonella typhi was 281.87 J/ml with 100% bacterial kill.

Key words: Ultrasonic dose exposure, ultrasonic wave, piezoelectric tweeter, Salmonella typhi, total plate count

ABSTRAK

Penelitian ini bertujuan untuk menentukan efek dosis paparan ultrasonik yang dapat mengurangi viabilitas Salmonella typhi dengan menggunakan variasi paparan waktu (15, 20, 25, and 30 menit) dan volume suspense bakteri (2, 4, 6, and 8 ml) pada kekuatan konstan. Sampel yang digunakan ialah Salmonella typhi. Transmiter gelombang ultrasonik ialah tweeter piezoelectric dengan daya 0,191 watt dan frekuensi 48 kHz yang dihasilkan oleh signal generator. Tweeter piezoelectric ialah sejenis tranduser yang mengubah energi listrik menjadi energi ultrasonik. Penelitian ini ialah percobaan laboratorium dengan desain random lengkap. Pengurangan persentase bakteri dihitung dengan menggunakan teknik pengujian total bakteri. Data dianalisis menggunakan Anova satu arah. Hasil menunjukkan bahwa variasi paparan waktu dan volume suspensi bakteri memberikan efek yang signifikan pada persentase Salmonella typhi yang mati. Dosis paparan ultrasonik untuk membunuh Salmonella typhi yang optimal ialah 281.87 J/ml dengan 100% bakteri yang mati.

Kata kunci: *Dosis paparan ultrasonik, gelombang ultrasonik, tweeter piezoelectrik, Salmonella typhi, pengujian total bakteri*

INTRODUCTION

Food is an important requirement for organisms because food serves as a source of carbohydrates, proteins, fats, vitamins, minerals, and other essential substances needed by organisms for growing process, developing process, and repairing damaged cells. Food and beverages consumed by humans must have good quality and free from pathogenic bacterial.

Pathogenic bacterial which often contaminate water, food, eggs and meat, fish and meat, milk and its processed products is Salmonella typhi.[1] Salmonella typhi is very dangerous because it is pathogenic to humans and causes fever.[2]

Most effort to obtain sterile food and beverage is using sterilization process. The method is used on sterilization process is heating. However, this method has the disadvantage because it reduces some nutrients contained